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Abstract

CONTRIBUTION OF THE REALIZATION OF A BIG NUCLEAR POWER PLANT IN THE DESIGN AND MANUFACTURE OF EQUIPMENT FOR REACTORS.

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CHAPTER I - Introduction.

Thé proposed paper shows, on the basis of the experience accumulated during the " ARDENNES POWER PLANT (Givet - France) " construction, the progress made by the manufacturing industry in the refinement of the fabrication procedures and outlines the future trends.

CHAPTER II - Characteristic elements in the design of Systems equipments.

1. Functional requirements of a nuclear power plant.

This paragraph sums up the functional requirements of the ARDENNES Plant, which have a direct bearing on the systems construction and equipment specifications.

2. Peculiar characteristics in the systems design.

2.1. Auxiliary systems.

The hereabove mentioned requirements have led to special solutions concerning :

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- corrosion control,
- regulation of soluble poison concentration and of water quality in relation with core operation,
- handling and treatment of radioactive charges and fluids,
- complete operational safety and high systems disponibility.

2.2. Control and Instrumentation.

This paragraph shows how have been resolved several control problems specificaly tied with the plant operating safety :

- design of a reliable power source for vital auxiliaries,
- analyse and preventive protection against accidents of nuclear origin,
- respect of the safety margins assigned by the core design,

2.3. Isolation philosophy for the reactor containment.

The isolation philosophy adopted for the ARDENNES Nuclear Plant is commented and conclusions are drawn to other plants.

3. Codes and Standards.

Typical examples are given which show the fundamental importance in the choice of codes and standards. This choice is all the more subject to discussions as are involved, like in the ARDENNES Plant, constructors and utilities of different countries.

4. Materials.

For the main parts of the primary installation, this paragraph describes the choice of the materials and the reasons for it.

CHAPTER III - Characteristic aspects in the equipment manufacture.

On the basis of practical experience obtained by the constructors of the ARDENNES Plant, this chapter defines new methods and procedures developped or industrialized for :

- welding and cladding,
- chroming,
- execution of small fabrication tolerances,
- heat treatments.

This chapter attemps to define what should be the criterias and the means adopted for :

- control of material and fabrication in shops,
- acceptance tests of the different equipment categories,
- nuclear cleanliness

CHAPTER IV - Specific test installations for nuclear equipment.

This chapter describes the installations especially designed for the development and testing, in operating conditions, of :

- primary pumps and valves,
- core elements,
- control rod drive mechanisms

CHAPTER V - Future trends in systems and equipments design, following the evolution of water power plant parameters.

CHAPTER VI - Conclusions.

The safety margins and fabrication procedures initialy adopted are evaluated, and from there on are proposed construction criterias industrialy adequate.